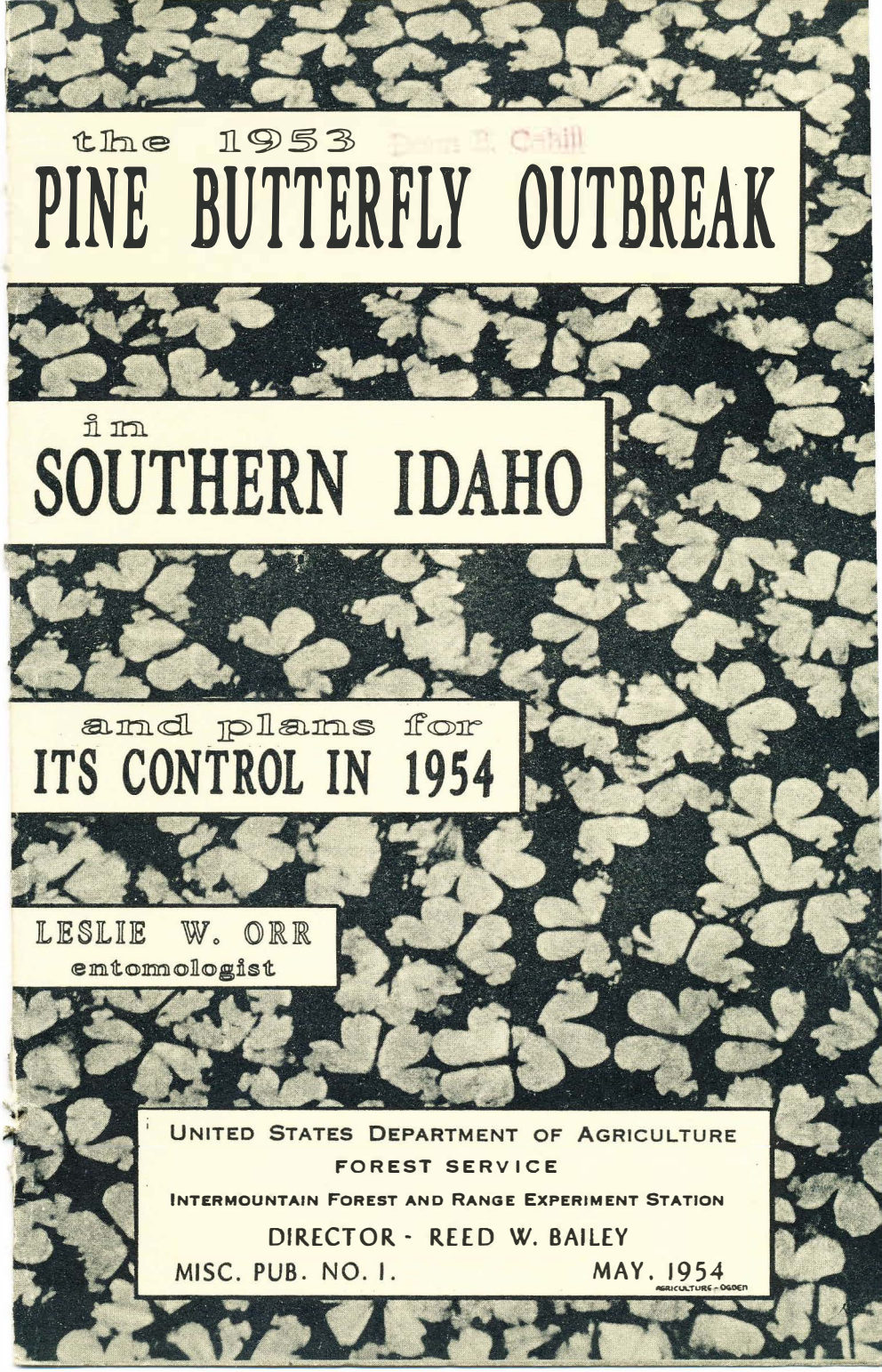

the 1953 PINE BUTTERFLY OUTBREAK in SOUTHERN IDAHO and plans for ITS CONTROL IN 1954

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THE 1953 PINE BUTTERFLY OUTBREAK IN SOUTHERN IDAHO AND PLANS FOR ITS CONTROL IN 1954

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The pine butterfly, Neophasia menapia, (F.& F.), is one of the most destructive insects affecting ponderosa pine. Several outbreaks have been recorded in past years. During the years 1893-1895, this insect killed about one billion board feet of ponderosa pine on the Yakima Indian Reservation in the State of Washington. In the New Meadows-McCall region of Idaho in 1922 and 1923 another outbreak killed up to 25 percent of the ponderosa pine on certain areas and reduced the growth of the trees that survived attacks. Several other 1- or 2-year outbreaks in Idaho have died out before causing serious damage.

Adult butterflies may be seen almost every year in August and September but it is only when they are present in very large numbers that damage may be expected.

THE PRESENT OUTBREAK

Since 1950 the adult butterflies have become more abundant each year in the general area between Lowman and Atlanta on the Boise National Forest. In the spring of 1953, overwintered eggs were found to be very abundant on the needles of trees being felled for lumber. By midsummer several areas of severe defoliation were observed. It was apparent that control measures would be required in 1954 to prevent an extensive loss of valuable pine forest.

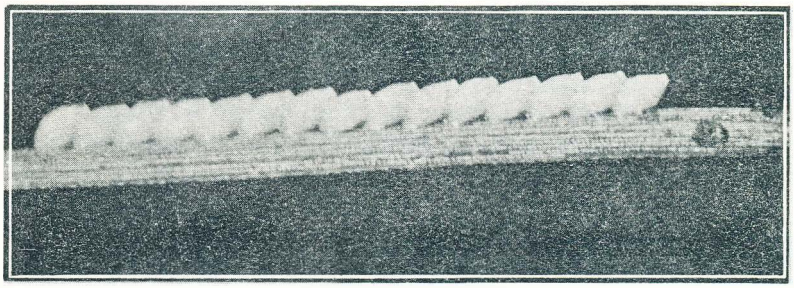
SURVEYS--Aerial and ground surveys in the fall of 1953 showed that a total of at least 169,000 acres of ponderosa pine timber was heavily infested. This area contains about 1.6 billion board feet of ponderosa pine with a stumpage value of about 30 million dollars. Stumpage value is the price at which standing trees are sold to a lumberman. In terms of lumber or finished products the value of this timber is much greater.

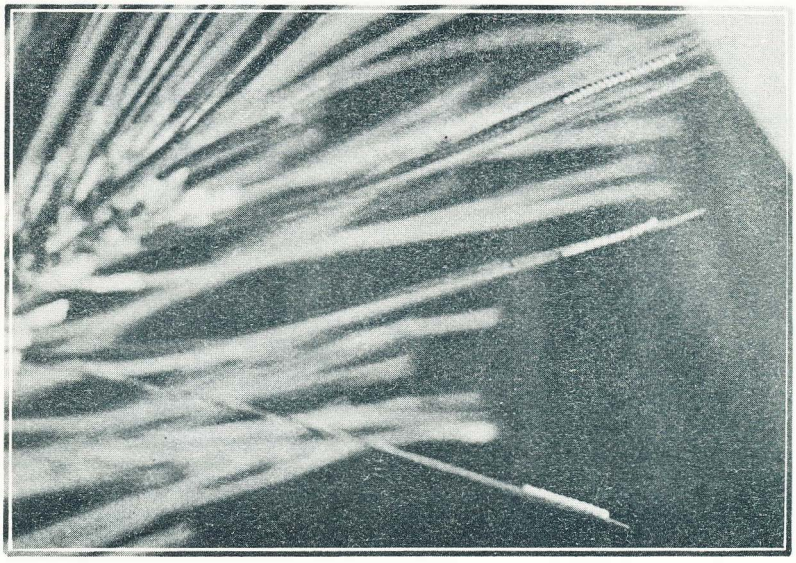
THE INSECT AND ITS HABITS

THE ADULT STAGE-- The adult insect is a white butterfly with black markings on the wings. The females are darker than the males and their wings have a yellowish cast in addition to the black markings. Wingspread averages one and three-fourths inches. Adults are present during August, September, and sometimes part of October. They are strong fliers and may drift long distances with the wind. After mating the females deposit their eggs on the needles of ponderosa pine. Each female is capable of producing nearly 100 eggs.

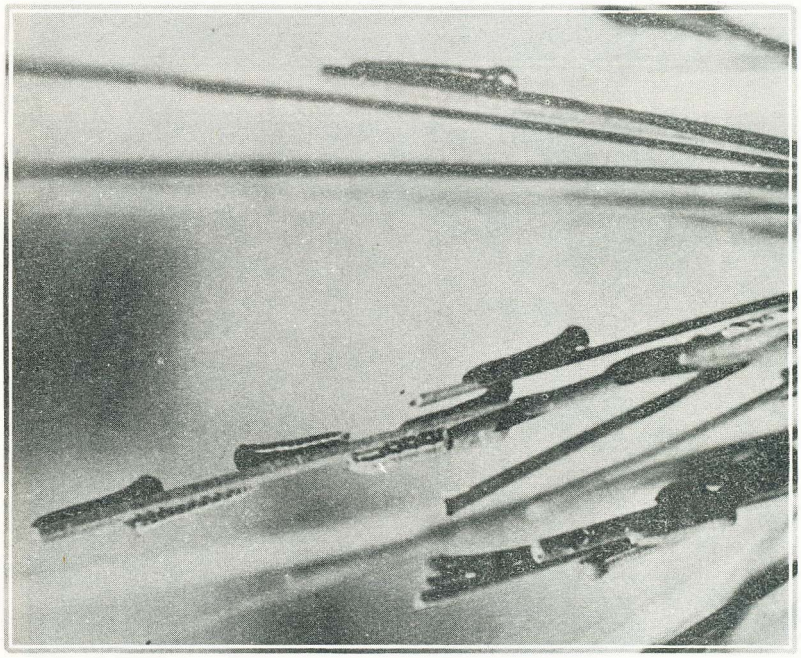
The adults feed only on flowers of various plants.

THE EGG STAGE--The eggs, emerald-green in color, are deposited in single rows, usually on the new needles. As many as 40 eggs have been found on a single needle and up to 741 on a single twig. They are firmly cemented to each other and to the needles for protection and resistance to the weather. The insect remains in the egg stage until the following spring.





THE LARVAL STAGE--The eggs hatch early in June. The tiny new caterpillars or larvae have green bodies and black heads. They feed in groups at the outer ends of the needles but scatter and feed singly as they become older and larger. After about two weeks their heads become green and two yellowish-white stripes soon appear along each side of their bodies. When full grown late in July they are about one and one-fourth inches long. Their green color and habit of lying flat against the needles throughout their feeding period make them inconspicuous. As a consequence, they can be very abundant on the trees without being detected by men working in the woods.



THE PUPAL STAGE -- The mature larvae attach themselves to needles, twigs, bark, or other objects and transform into the nonfeeding pupal stage. Male pupae or chrysalids are light green while the females vary from dark green to almost black. The pupae of both sexes have yellowish white lines similar to those on the older larvae. During the pupal stage the insect undergoes a remarkable transformation from a larva or caterpillar to a butterfly. When this change is completed, after ten days to two weeks, the adult butterflies emerge from the pupal cases. Mating soon takes place and then the females begin to deposit their eggs on the pine needles, thus completing the life cycle.

There is considerable variation in the rate of development of the individual insects in a given area. Some individuals complete their development and emerge as adult butterflies while others are still larvae or pupae. Consequently, larvae, pupae, and adults may all be found at the same time and butterflies may be present from early in August until late in the fall.

SIGNS OF INFESTATION--When the larvae have completed their feeding period many of them drop to the ground on silk threads. Travel or work in heavily infested areas is made very unpleasant by the presence of millions of these threads hanging from the trees. Larvae of the spruce budworm, a defoliator of Douglas-fir and true fir, also have this habit of dropping on silk threads and may easily be confused with the pine butterfly. The spruce budworm is very abundant throughout most of the area now infested by the pine butterfly. However, the budworm larvae are brown with yellowish, pale-green markings.

Another sign that large numbers of butterfly larvae are present is the accumulation of excrement or droppings from the larvae on the ground beneath infested trees. This material is in the form of small, green pellets. The pellets from young larvae are very minute but those from mature larvae are about one-sixteenth inch in diameter. In 1953 the ground in heavily infested areas became literally covered with these pellets.

Heavily infested trees are completely stripped of their needles by the time the larvae become full grown. Most of this feeding is done during the last week or ten days of the feeding period. The old needles are eaten first but the older larvae will also eat the new needles of the current season. Defoliation therefore ranges from slight to complete, depending upon the number of larvae present on each tree.

The upper picture on the next page illustrates nearly complete defoliation, while the lower picture shows a comparison between defoliated and normal twigs.

NATURE OF DAMAGE

When the larvae of the pine butterfly eat the needles on a pine tree they destroy the tree's ability to manufacture food. A tree is very likely to die if more than three-fourths of its needles are destroyed. If such a tree survives, its rate of growth will be greatly reduced for as long as ten years following the year of defoliation. Much of the pine timber in the presently infested area on the Boise National Forest is overmature and would be killed or at least seriously weakened in 1954 if airplane spraying to kill the butterfly larvae could not be conducted. Defoliation that occurred in 1953 has already killed some of the trees and weakened the others on several thousand acres. These weakened trees will be susceptible to attack by bark beetles even though additional defoliation is prevented by airplane spraying in 1954. Fortunately, the danger has been recognized and provision made to apply control before the damage becomes more extensive.

NATURAL ENEMIES

Past outbreaks of the pine butterfly have usually lasted only two or three years. Reports have indicated that parasites became very abundant during the second or third year and that they were responsible for stopping the outbreaks. The species that appears to be most important is a slender, wasplike insect called Theronia fluvescens which kills the butterfly pupae. It was common in the outbreak area in the fall of 1953 and can be expected to increase greatly in 1954.

Unfortunately, feeding by the butterfly larvae is completed for the current year before the parasite kills its host. Consequently, even if the parasite should kill most of the butterfly pupae in 1954, this would not take place in time to prevent extensive and very severe defoliation in 1954. Direct control by airplane spraying is therefore necessary to prevent the loss of a large volume of valuable timber.

CONTROL PLAN FOR 1954

Funds have been provided to cover the cost of airplane spraying of at least 190,000 acres of infested timber in June and July 1954. This will allow the treatment of lightly infested area surrounding the 169,000 acres of heavy infestation. It will also reduce the amount of damage by the spruce budworm in this additional area. An oil solution of DDT will be applied at the rate of one gallon of solution containing one pound of DDT per acre. In July 1953, a 400-acre block of the infested area was sprayed experimentally at this rate in anticipation of the need for extensive spraying in 1954. Results were excellent, assuring success for the present project.

EFFECTS ON WILDLIFE, LIVESTOCK, AND PROPERTY--The application of DDT at the rate of one pound per acre for the control of the spruce budworm and certain other forest insects in other parts of the country has never caused any serious damage to fish, birds, wild animals, or domestic stock. People living within sprayed areas have been gratified by the reduction in numbers of flies, mosquitoes, and other similar pests for two or three weeks following application of the spray. Cars and other vehicles that may be in a spray area will receive a coating of fine spray droplets and should be washed to remove the film of oil.

CONTROL PROCEDURE--Spraying will begin soon after the eggs hatch, probably about June 10, and will continue until the job is completed. It is hoped that conditions will permit most of the area to be covered before the larvae are more than three-fourths grown. By far the greater proportion of the feeding is done during the last two weeks of the larval period when the larvae are nearly full grown. If this part of their feeding can be prevented the trees will suffer no serious defoliation in 1954. It is therefore important that the spraying begin as early as effective work can be done and that it be pushed rapidly but within the bounds of good safety practices that will assure full protection of the men and equipment.

Most of the spraying will be done in the early morning hours between sunrise and 9:00 a.m. when temperature and air conditions are most favorable for such work. It is expected that at least two large planes will operate from a new air strip at Warm Springs east of Lowman and at least three others from the field at Idaho City.

Ground crews will check the rate of development of the insect, the amount and distribution of the spray deposited in each area, and the percent of kill of the butterfly larvae after each area is sprayed. This is necessary to insure that all of the infestation is treated effectively.

A survey will be conducted later in the season to determine whether there is any infestation remaining in the treated area and whether new centers of infestation have developed in other areas.

COOPERATION ON THE PINE BUTTERFLY CONTROL PROJECT--Representatives of the logging industry, State of Idaho Department of Forestry, the Keep Idaho Green Committee, the Southern Idaho Forest Protective Association, and the various Federal land-owning and land-managing agencies have cooperated wholeheartedly in conducting surveys and furnishing information to serve as a basis for planning and executing this control project. The great amount of interest that has been shown by these people and by the general public is evidence of a realization of the tremendous values at stake. The unified objective of this project is to protect our ponderosa pine forests so that they may continue to produce a maximum timber supply for our country's needs, now and in the future.